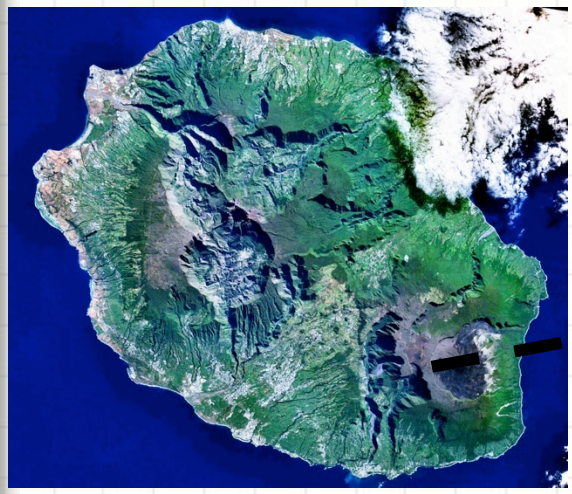
Maïdo observatory: a new high-altitude station facility at Reunion Island (21° S, 55° E)

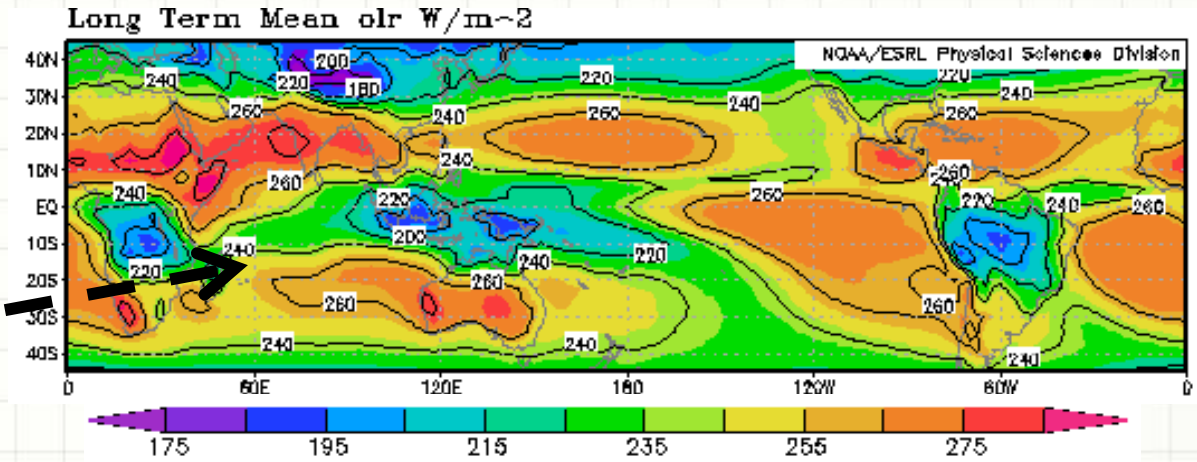
S. Evan, F. Posny, J. P. Cammas, V. Duflot, J. Leclair de Bellevue, J. M. Metzger, H. Vérèmes, J. L. Baray

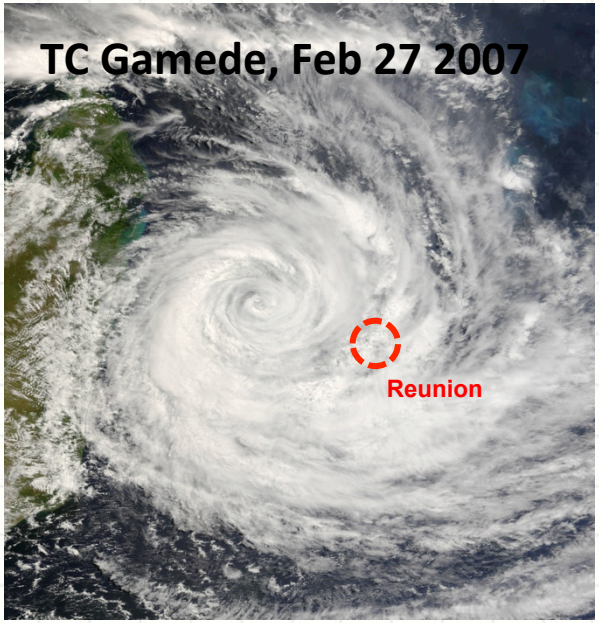
GRUAN ICM6, Washington DC, 10-14 March 2014

Reunion Island: Austral Summer

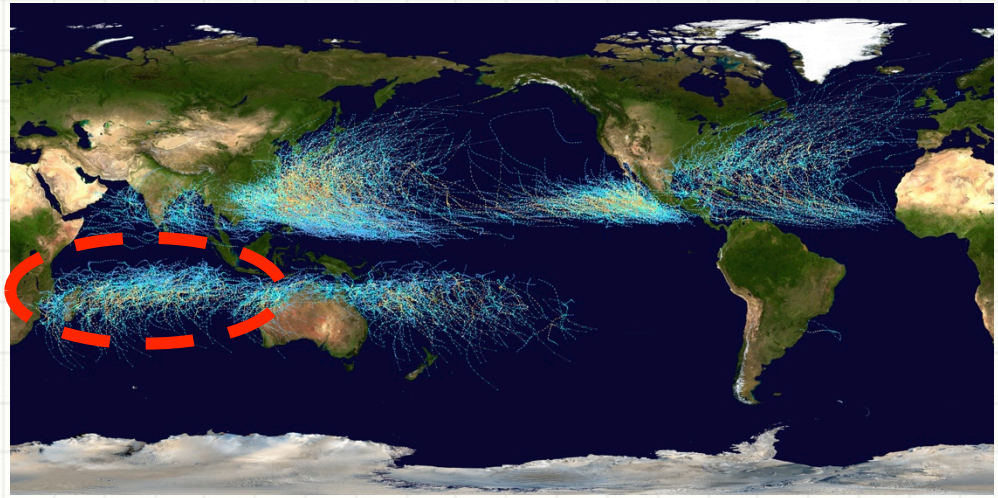


NOAA OLR Dec-Jan-Feb



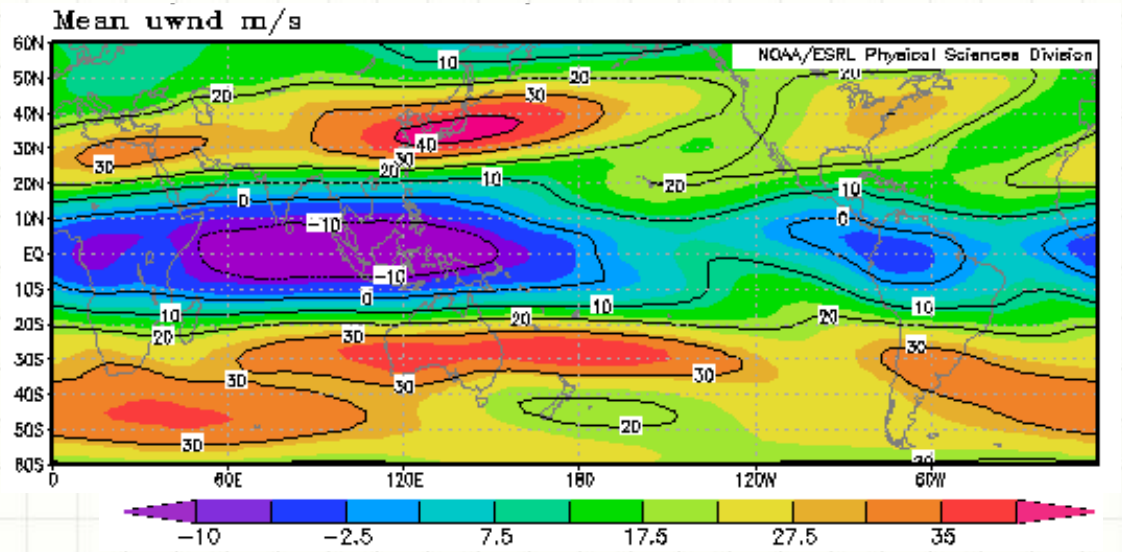


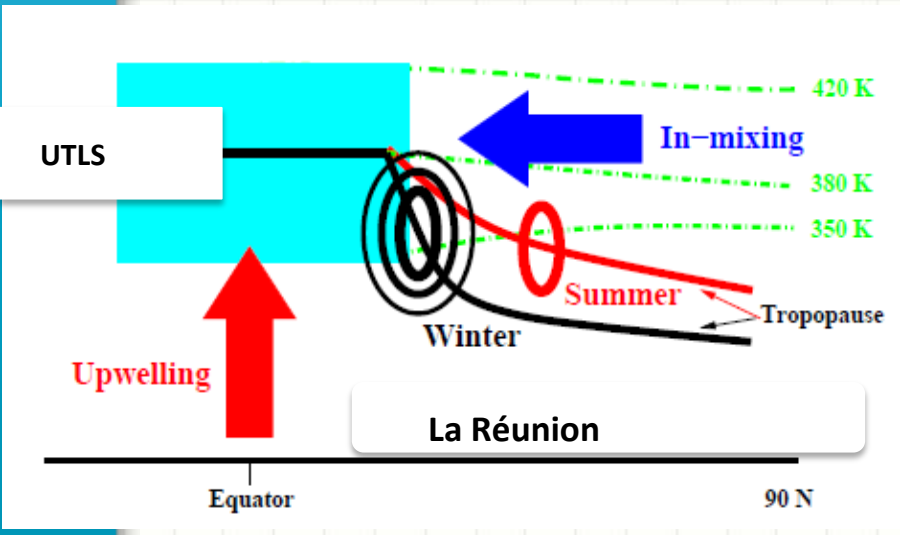
Global TC Tracks 1985-2005

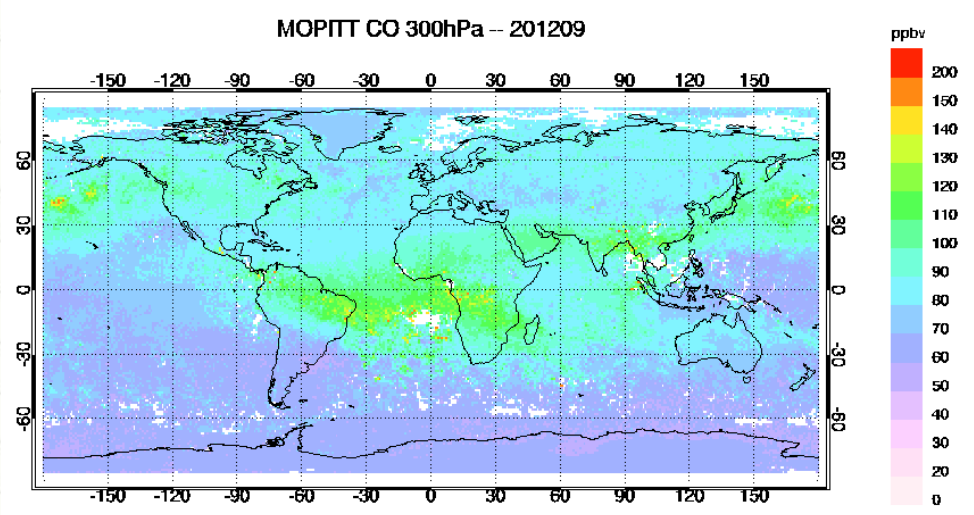


Reunion Island: Austral Winter

NCEP U@200hPq Jul-Aug



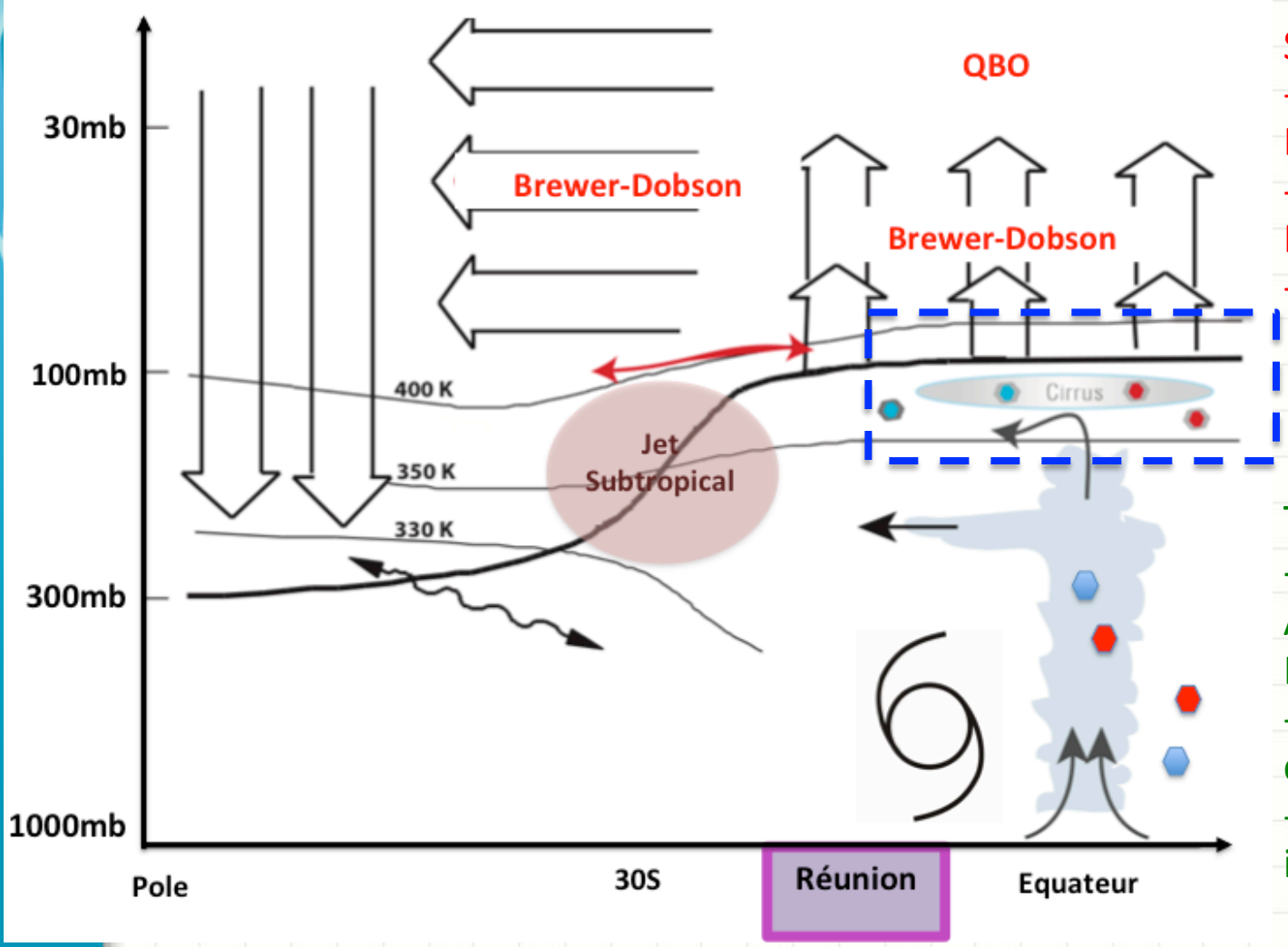




Tropical Upper Troposphere-Lower Stratosphere

UTLS the "Gateway to the stratosphere" [Holton et al. 1995]

Reunion Island at 21°S has a strategic position to observe the chemistry and transport of chemical species into the tropical UTLS

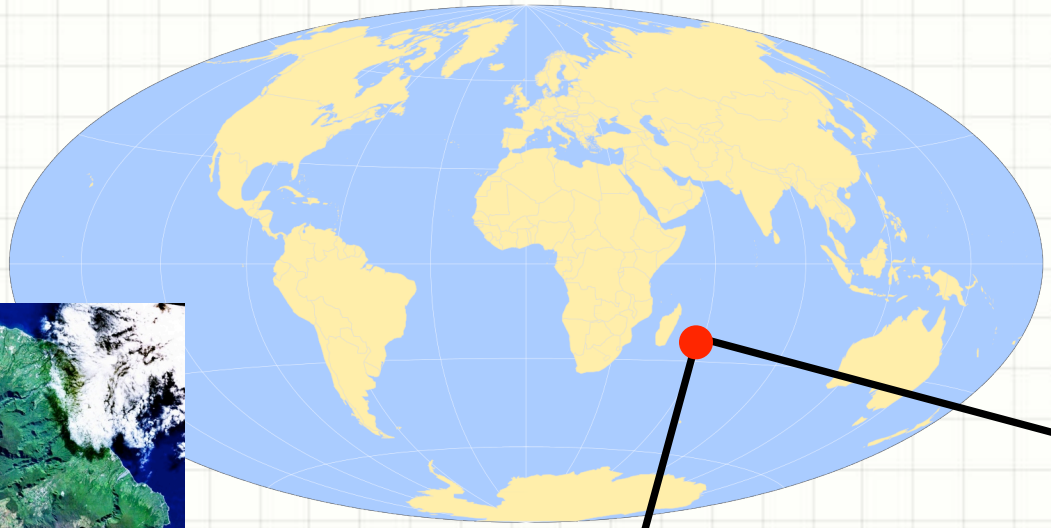


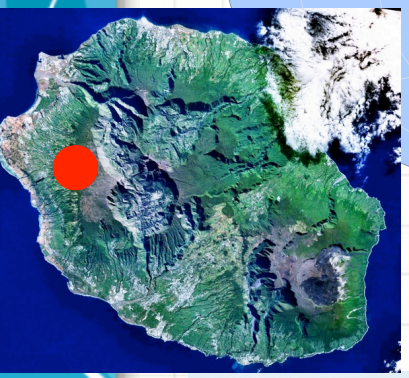
Stratosphere:
-Large-scale Brewer-Dobson Circulatio
- Gravity Waves and Planetary Waves
- O_3 , **H_2O**

UTLS:
H_2O, O_3, Cirrus

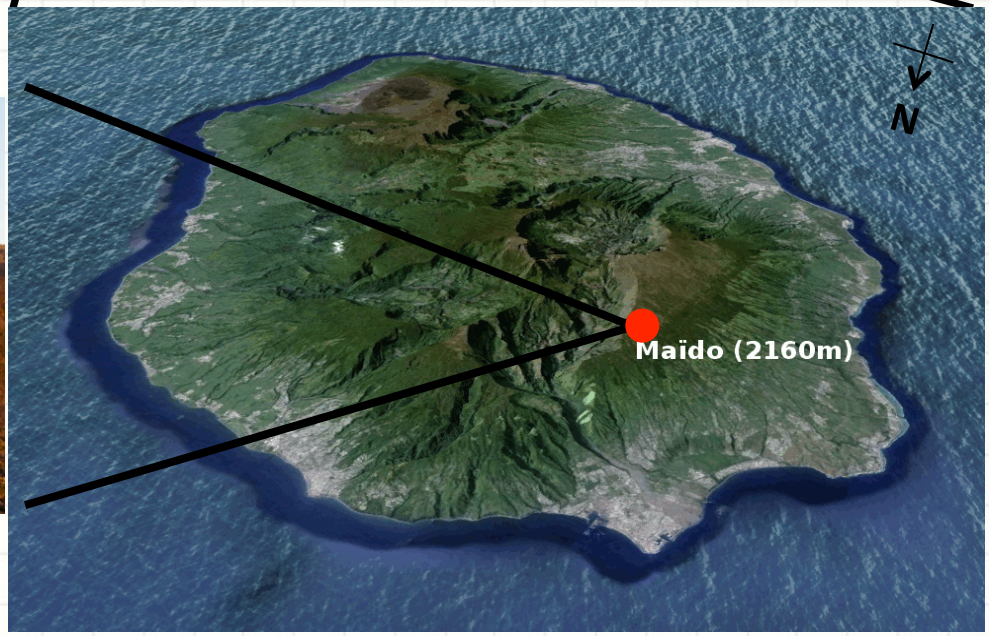
Troposphere:
-Chemical Composition, Aerosols, O_3, CO, H_2O, Halogenes
- Hurricanes and convective processes
- Ocean-Atmosphere interactions.

The New Maïdo Facility : Baray et al. 2013 AMT





~100m long, ~600m^2 surface



✓ Regionally representative

✓ Above boundary layer and free of the influence of significant local pollution sources

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Observatoire de Physique de l'Atmosphère de la Réunion

The New Maïdo Facility: objectives

- **Permanent station for long term atmospheric observations** : dynamic and chemistry of the troposphere and the stratosphere in the context of **climate change** in the **southern hemisphere**

- Provide data for:
  - **international monitoring networks**
  - **scientific research**
  - **satellite validation**

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de l'Atmosphère de la Réunion

Supporting agencies

UNIVERSITÉ DE LA RÉUNION
S'ouvrir aux mondes

cnrs INSU
Observer & comprendre

METEO FRANCE

Supported networks

NETWORK FOR THE DETECTION OF ATMOSPHERIC COMPOSITION CHANGE
NDACC
Exploring the Interface between Changing Atmospheric Composition and Climate

NASA • GSFC
SHADOZ
Southern Hemisphere ADditional OZonesondes

NORS
Network of Remote Sensing Ground-Based Observations for the GMES Atmospheric Service

World Meteorological Organization
Global Atmosphere Watch
Organización Meteorológica Mundial
Organisation Météorologique Mondiale
Всемирная Метеорологическая Организация

TCCON
total carbon column observing network

ACTRIS

ICOS
integrated carbon observation system

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The New Maïdo Facility

A large scientific community of 11 labs involved for 1 monitoring station

~6 persons involved in the routine activities

Access to the station ~4 times/week

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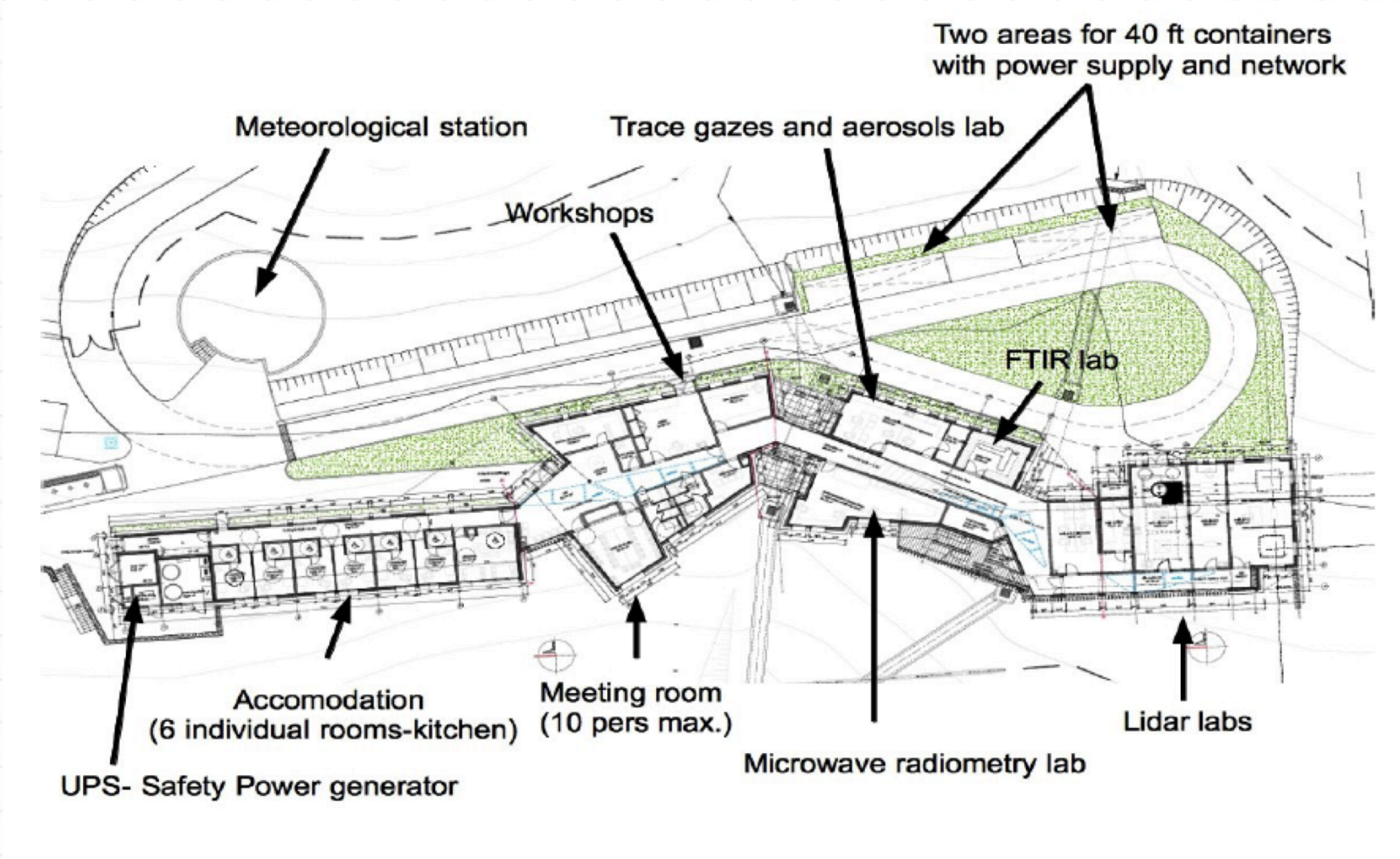
The New Maïdo Facility: instruments



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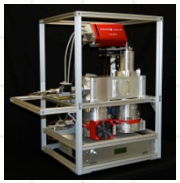
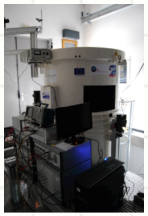
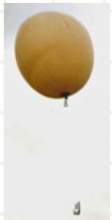
The New Maïdo Facility: instruments

Instrument		Parameter	Period
Aerosols optical properties			
Mobile sun photometer		AOD	15min
Mobile lidar		Backscattered light	2/week
Aerosols numbers			
CPC		Aerosol total number	1min
Aerosols chemistry			
Chemical filters		PM, ions (Cl, NO3, SO4, Na, K, Mg, Ca), organic tracers	1/week

Instrument		Parameter	Period
Dynamics			
Wind lidar		Strato wind	1/month
T° lidar		T°	2/week
Radio-sounding		P, T°, wind	1/week
Electrical activity			
TLE camera		Transient luminous events	N/A
VLF antenna		Lightning	N/A

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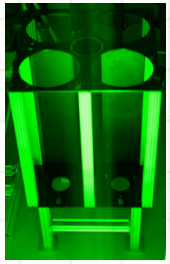
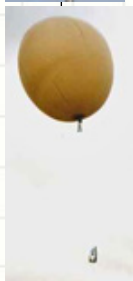
The New Maïdo Facility: instruments

Greenhouse gases, Ozone, Water vapor

Instrument	Parameter	Period
FTIR 	CO_2, CH_4, H_2O	6/day
Tropo O_3 lidar 	O_3	2/week
Strato O_3 lidar 	O_3	2/week

Instrument	Parameter	Period
Water vapor lidar 	H_2O	2/week
GPS 	H_2O	5min
Radiosounding 	H_2O, O_3	1/week

Data Access:
https://opar.univ-reunion.fr/

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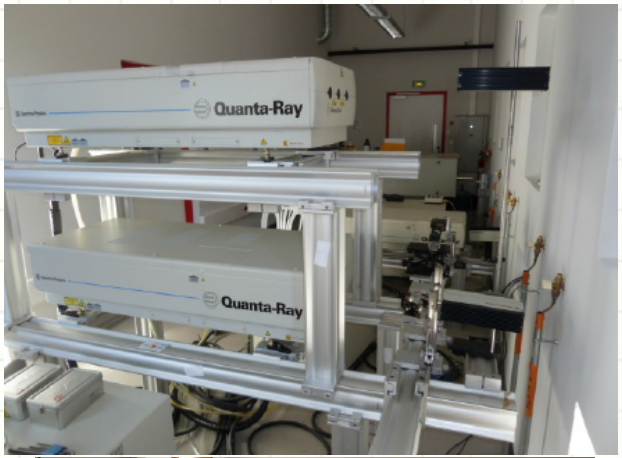
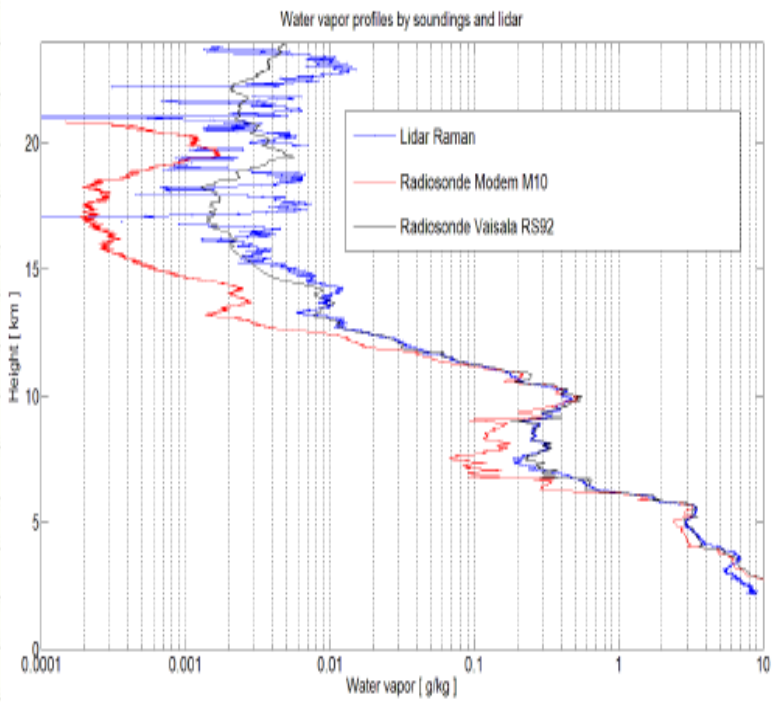
The New Maïdo Facility: the water vapor LIDAR

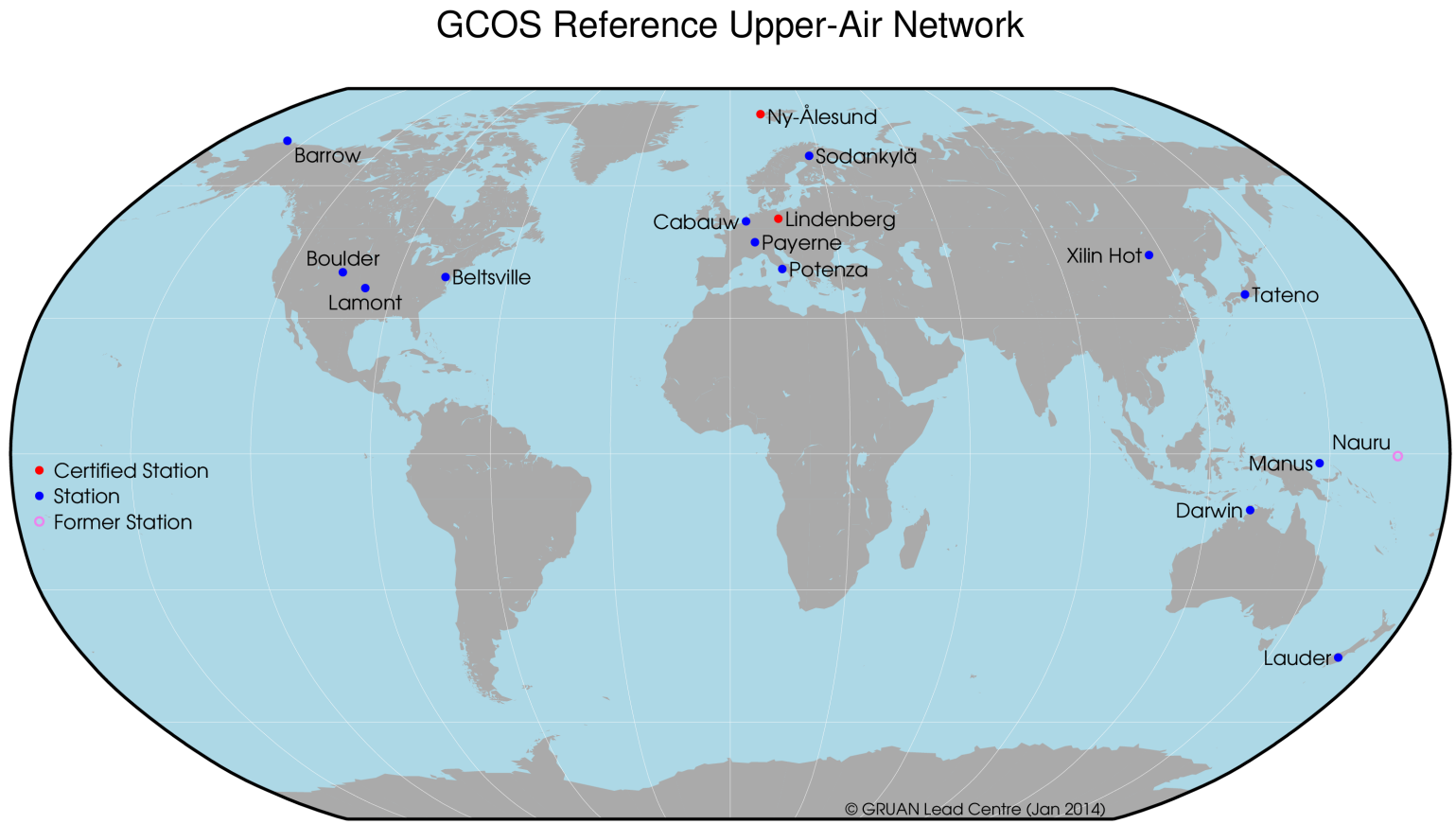
A Raman Lidar at Reunion Island (Hoareau et al. 2012)
Raman Lidar Calibration (Dionisi et al., 2014, draft)
MALICCA Camaign (Keckhut et al., 2014, draft)



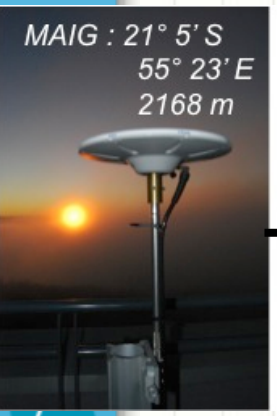


June 2014: Comparison with the NASA Raman Lidar for NDACC certification

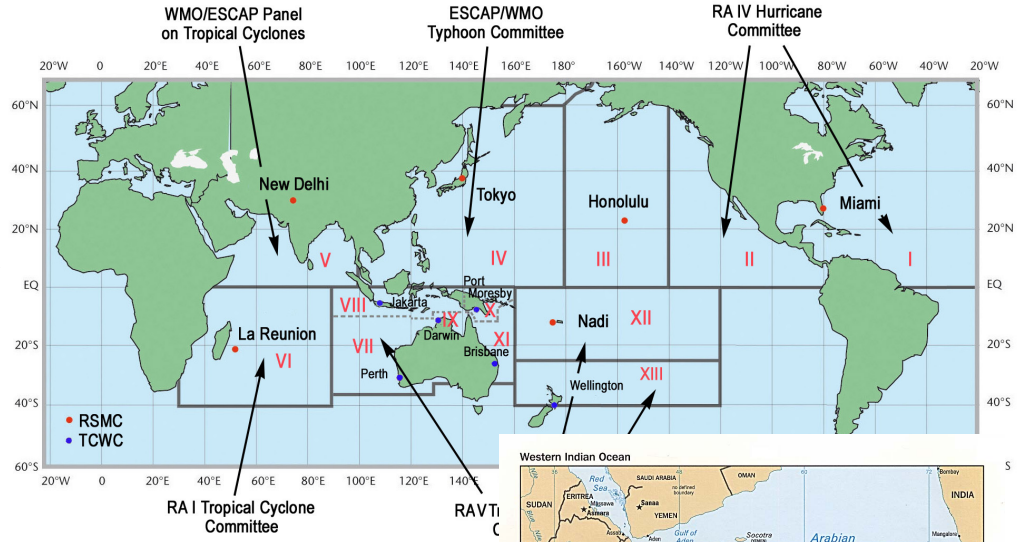
Reunion and Le Sirta as new GRUAN sites …



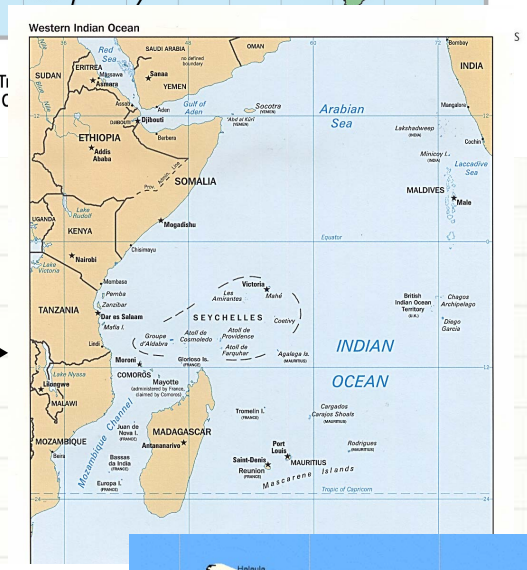
- GNSS data: total water vapor column
- Sondes M10
- Water vapor LIDAR : Water vapor profiles up to ~20 km



GNSS data for improving tropical cyclones predictions

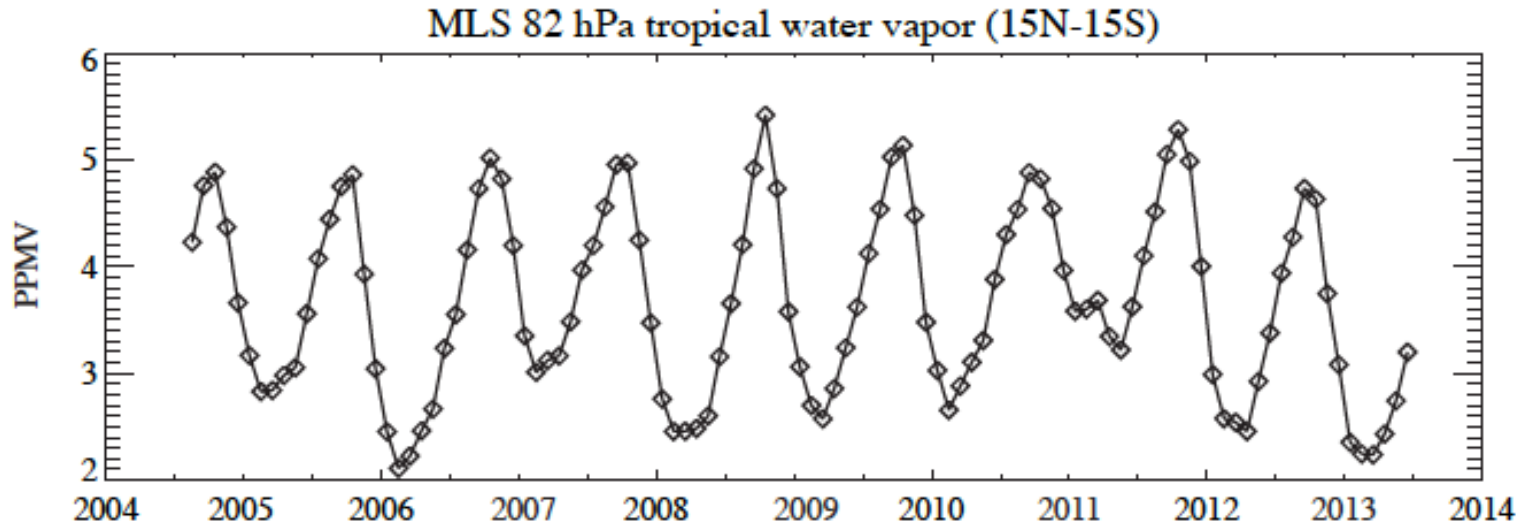


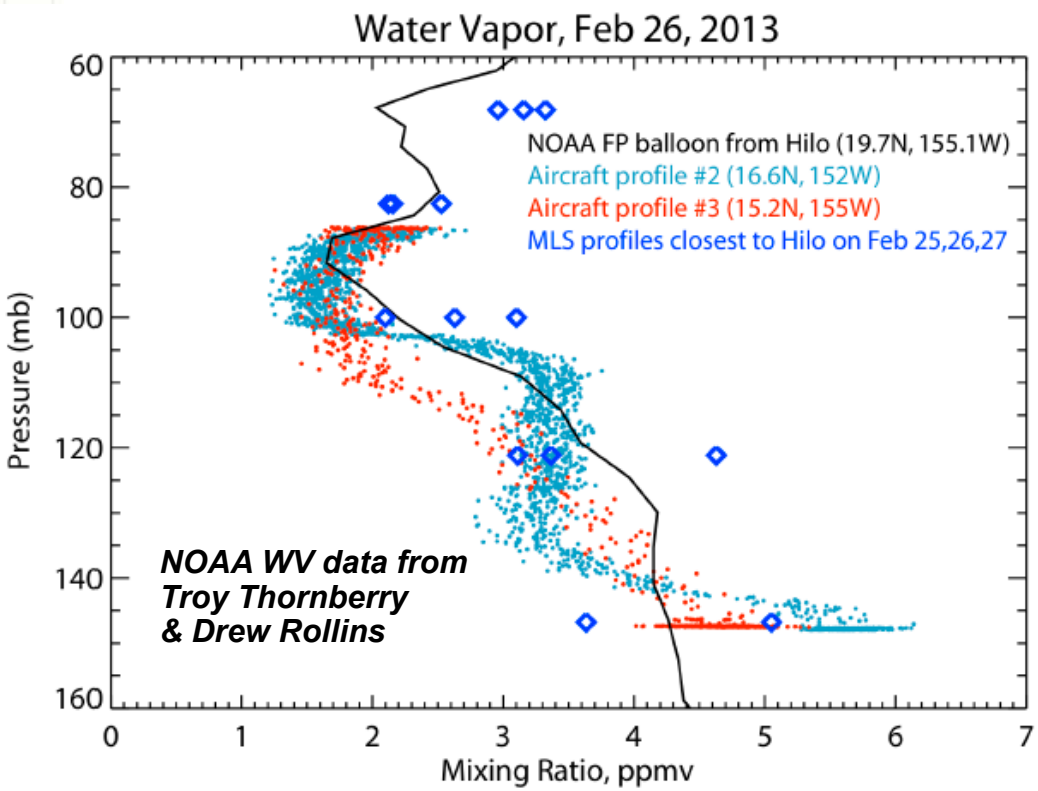
Improving the Modem Sondes can benefit other national weather agencies in the SW Indian Ocean



Water vapor data from the Raman Lidar important to study the tropical UTLS in the Southern Hemisphere, Possible comparison with other observatories ?

Reunion as a new GRUAN site: Long-term monitoring of stratospheric water vapor ?





Boreal winter 2013 was extremely dry due to the Jan 2013 SSW

Thank you

Questions ?